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## DESCRIPTION OF A NEW KNAPSACK SPRAYER.

BY B. T. GALLOWAY.

Since writing the note in the last JOURNAL, relative to a new spraying pump designed by us, all parts of the machine have been perfected, and two firms in this city, Albinson & Company, 2026 Fourteenth street, and Leitch & Sons, 1214 D street, are now manufacturing it.

In view of the fact that any one has the privilege of making and selling this pump we have thought it best to give a detailed description of it, accompanied by illustrations of such a character that any intelligent machinist can use them as working drawings. The demand for the sprayer will be largely confined to the spring and early summer months, and to those who contemplate manufacturing it we will say that it is of the utmost importance to have the pumps in stock at this time. As a rule we find that the men who use machines of this kind wait until the last moment before sending for them, consequently they are anxious to have their orders filled promptly which, so far as our experience goes, is never done. Hence, therefore, the importance of having sufficient machines on hand to fill all orders without delay. Coming now to a description of the machine we have first:

*The Reservoir* (Figs. I and II).—This is made of 16-ounce copper, and

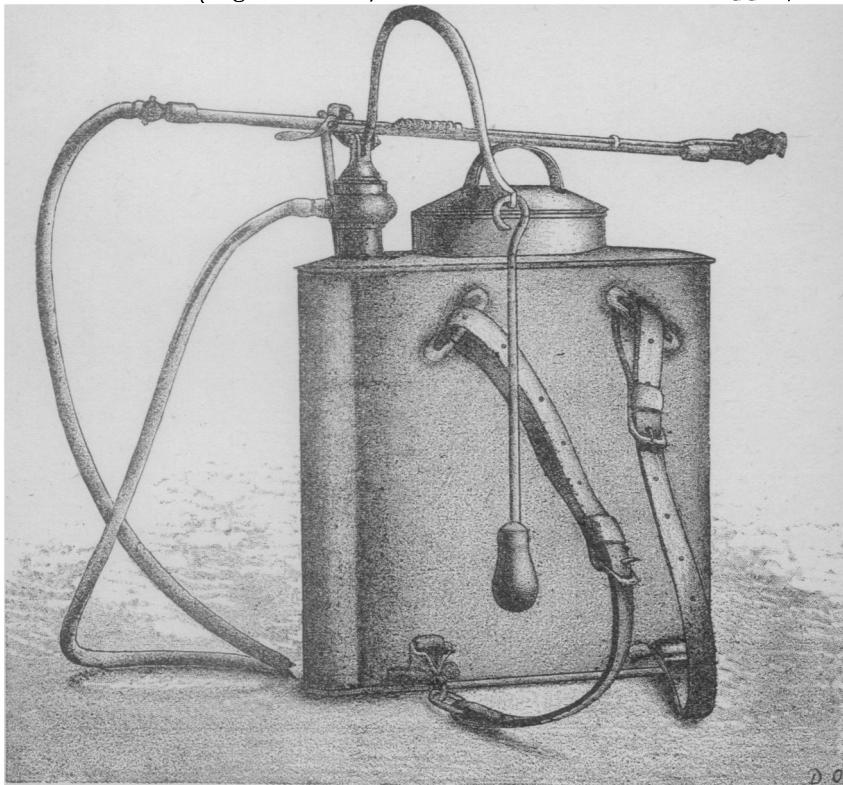


FIG. I.

holds a little over 4 gallons. We first tried 14-ounce copper, and found it too light, on the other hand 20-ounce seemed to be heavier than was necessary, so that we finally adopted the medium grade, which has given perfect satisfaction.

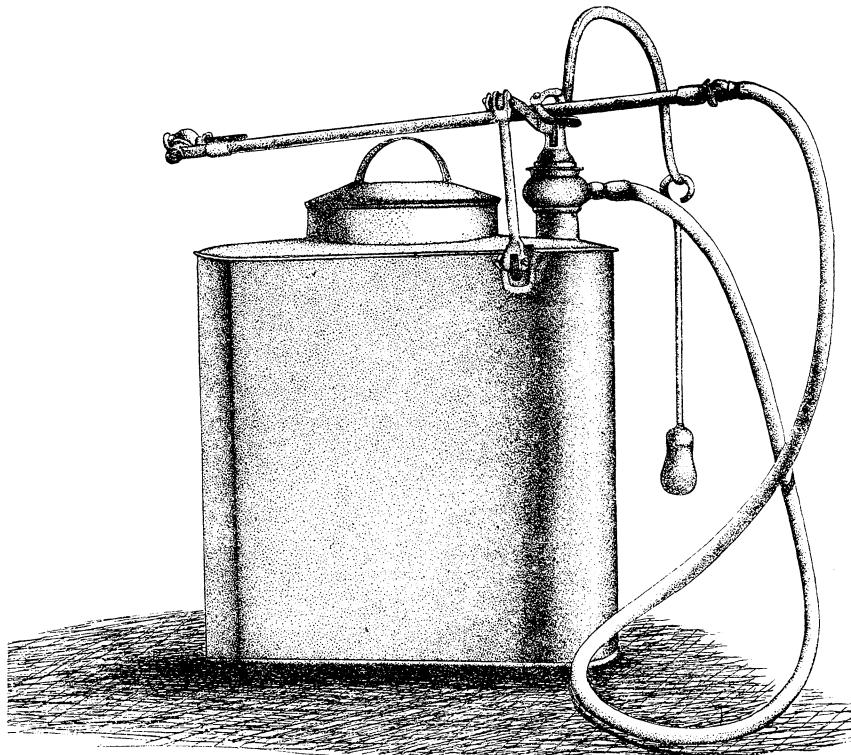


FIG. II.

The height of the reservoir is 16 inches, its breadth 15 inches, and depth 5 inches, 10 pounds of copper being necessary for a tank of these dimensions. When filled with the Bordeaux mixture, or any of the copper solutions now in use, the machine weighs practically 50 pounds, which is about as much as a man wishes to carry on his back for any length of time. In fact we find very few men able to carry such a load constantly for more than a few days at a time. This is why we did not make the reservoir larger, as some advised us to do, thinking one of 6 gallons' capacity about the proper size. Where the pumps are being used three days out of every fifteen, as is the case with many vineyardists, a 6-gallon reservoir would probably not be too heavy, but for a man using the machine six days in the week for three or four months, as must be done in large nurseries, it is simply out of the question.

The bottom of the reservoir as well as the top is soldered in, and, as is shown in Fig. III, the top is provided with two openings, one for the pump and the other for introducing the liquid. The pump orifice,  $a$ , is  $1\frac{1}{2}$  inches in diameter, while the opening for the liquid,  $b$ , is  $4\frac{1}{2}$  inches

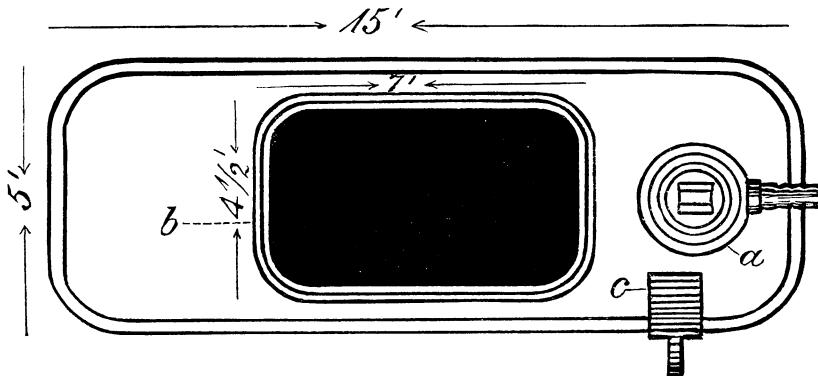


FIG. III.

wide by 7 inches long. Above and surrounding this opening is a rim  $1\frac{1}{2}$  inches high, into which is fitted a strainer, made of fine copper wire. The strainer, Fig. IV, rests on a slight projection made in the copper

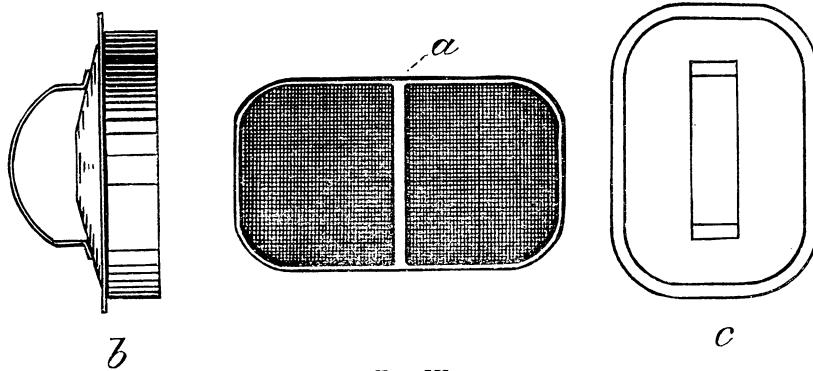
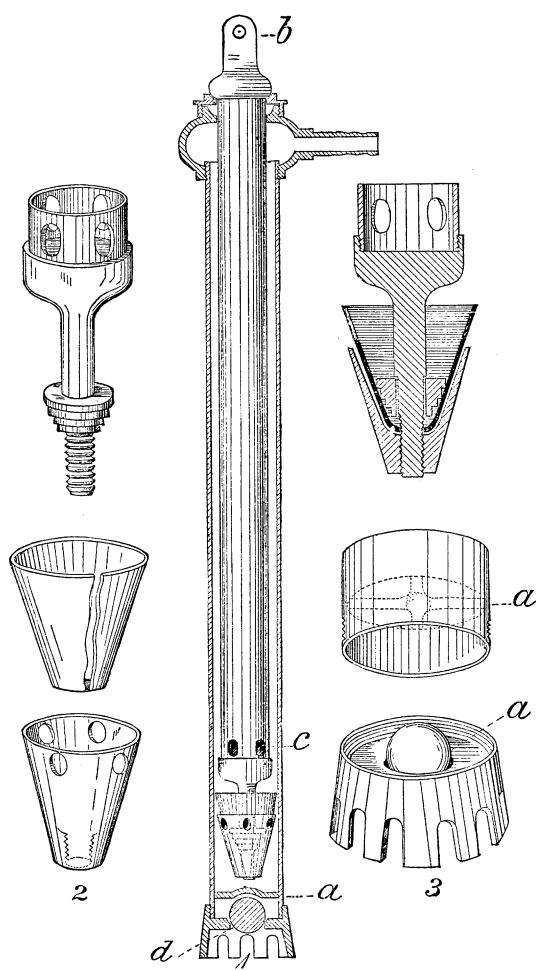


FIG. IV.

at the bottom of the rim, and is removed by means of a handle across the middle,  $a$ , Fig. IV. For closing the opening a lid made of copper, Fig. IV,  $b$  and  $c$ , is used, this fitting down tightly in the rim.

*The Pump.* (Fig. V.)—The pump is  $17\frac{1}{2}$  inches long and  $1\frac{1}{2}$  inches in diameter, and for making it 6 castings, weighing  $2\frac{1}{2}$  pounds,  $15\frac{1}{2}$  inches of  $1\frac{1}{2}$ -inch brass tubing and  $14\frac{3}{4}$  inches of 1-inch brass tubing, are required.

It is not necessary to go into the details of the various parts of the pump, as the figures and explanations thereto will, we think, enable any one to understand the offices of the various parts. The pump is



soldered to the bottom of the tank, the solder being placed at the several points shown at *a* in Fig. VI.

It is fastened at the top, Fig. VI *b*, by means of solder also; for some reasons this is objectionable, but as it will not be necessary to remove the tube it is not a serious inconvenience after all. To obviate the difficulty, however, a nipple might be soldered in the tank at *b*, into which the tube could be screwed. The plunger is made in two styles, but for various reasons we have abandoned that shown in Fig. V, and now use only the form illustrated at VII. This is screwed to the end of the tube, the end being left open to do away with the necessity of side port-holes as shown at *c*, Fig. V. As seen in the cut, the plunger is not packed, the space *bb* being left for this purpose; ordinary wicking is used for packing.

In using the pump the hollow piston is drawn up creating a vacuum into which the liquid rushes through the opening *d*, Fig. V. The piston is then forced down and this closes the valve *d*, Fig. V, and opens the one at *a*, Fig. VII. This operation being repeated the liquid is forced out of the opening in a continuous stream, the latter being effected by means of the air-chamber in the piston. The figures show plainly the various parts necessary for working the pump, attaching the reservoir to the back, etc. We use as a rule about 4 feet of  $\frac{7}{8}$ -cloth insertion hose, and this is fastened to the pump and lance by means of copper wire.

*Lance and Nozzle.*—These are practically the same as described by us in a previous number of the JOURNAL,\* the only difference being a change in the location of the spring which operates the degorger.

Summing up briefly the cost of such a machine as here described, we have the following:

10 pounds 16-ounce sheet-copper, at 23 cents per pound.....	\$2.30
2 $\frac{1}{2}$ pounds castings, at 25 cents per pound.....	.62
Castings and labor on lance .....	2.00
Straps and hose.....	.75
13 hours' labor, at 40 cents an hour.....	5.20
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Total.....	10.87

\* Vol. 5, No. II, p. 96.

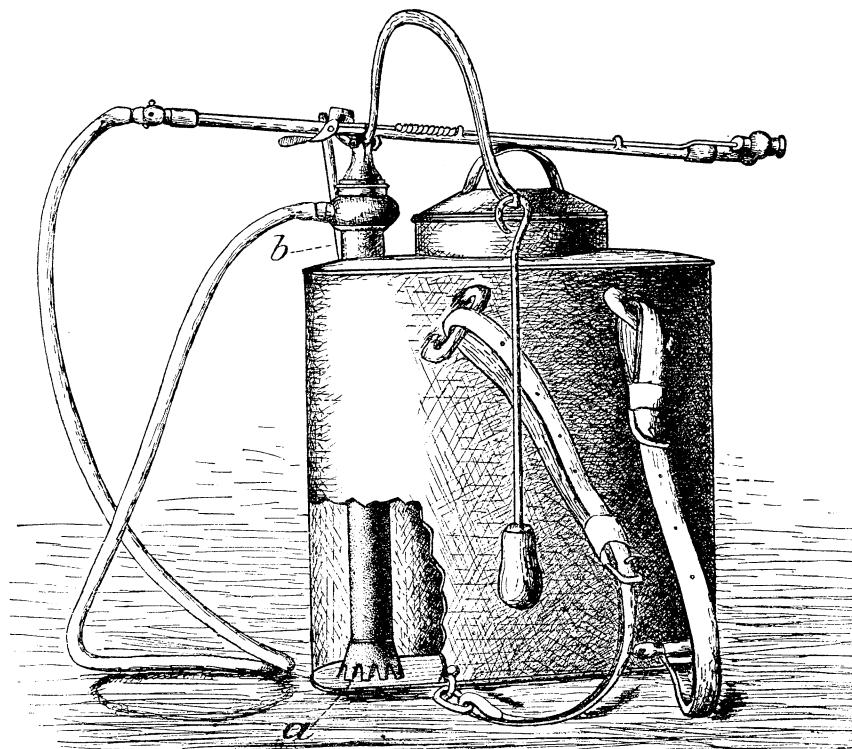


FIG. VI.

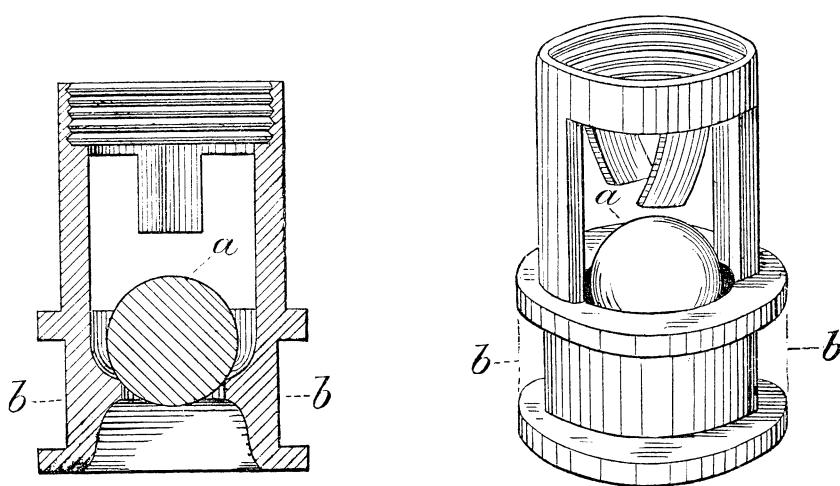


FIG. VII.

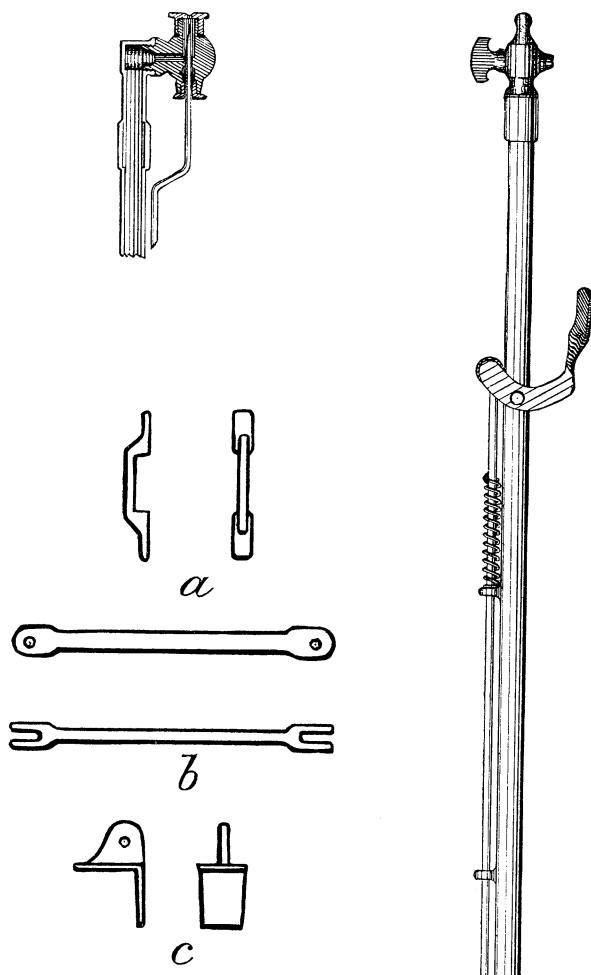


FIG. VIII.

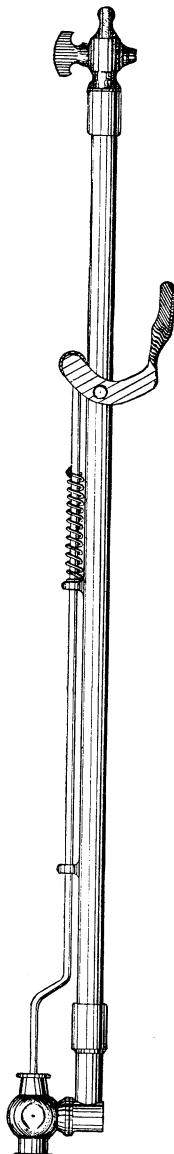


FIG. IX,



FIG. X.

## EXPLANATION OF FIGURES.

FIG. I. Front view of reservoir showing straps and attachments, pump, handle, lance, and hose.

II. Back view of reservoir showing pump, handle, lance, hose, and fulerum; also manner of attaching the latter.

III. Top view of reservoir. Top view of pump, opening  $2\frac{1}{2}$  inches in diameter *a*; opening for introduction of liquid, 7 inches long,  $4\frac{1}{2}$  inches wide, *b*; casting for holding the fulcrum, *c*; one-fourth actual size.

IV. Strainer, 7 inches long,  $4\frac{1}{2}$  inches wide, 1 inch deep; wire gauze soldered on the bottom, and handle *a* across the top; *b* and *c* lid, one-fourth actual size.

V. Pump complete. 1 one-fourth actual size; 2 and 3, one-half actual size. The plunger shown here has been abandoned and the one at Fig. VII substituted. The cross piece made of brass shown at *a* in 1 and 3 is retained in the new form. This piece holds the ball of the valve in place.

VI. Front view of reservoir showing pump inside; soldered at points seen at *a*.

VII. Plunger with ball valve showing ball at *a*, and space for packing at *bb*, actual size. The tube to which this is fastened is  $14\frac{1}{2}$  inches long, making the total length with the piece marked *b*, in Fig. V, 17 inches.

VIII. Casting for attaching straps, *a*; fulcrum, *b*; casting which is soldered to reservoir *c*, as shown in Fig. II, and to which the lower end of the fulcrum is fastened by means of a bolt. All one-fourth actual size.

IX. Lance and nozzle one-fourth actual size.

X. Sprayer in use.

## RECENT INVESTIGATIONS OF SMUT FUNGI AND SMUT DISEASES

AN ADDRESS DELIVERED BEFORE THE SOCIETY OF AGRICULTURISTS OF BERLIN  
FEBRUARY 17, 1888.

BY DR. OSKAR BREFELD,

*Full Professor of Botany in Münster in W.*

[Translated from *Nachrichten aus dem Klub der Landwirthe zu Berlin*, Nos. 220-222, by Erwin F. Smith.]

*(Continued.)*

As early as 1884 I began to make infection experiments on host plants, but soon, on account of the great number of details involved and the unimproved condition of my eyes, I was convinced that I could not carry through the experiments without assistance. Only upon my entrance into the Ministry of Public Instruction and transfer to Münster in Wesen was the help of an assistant in Mycology willingly granted me. This I had previously done without, having requested it of the Forest Department of the Ministry of Agriculture and been refused, although it was desired only as a compensation for my eye lost in direct government service. With this help, which I secured in the person of Dr. G. Istvanffy, privat docent in the University of Klausenburg in Hungary, I was able to bring the experiments to a relative conclusion.